SIZE-EFFECTS IN PLANE STRAIN SHEET-NECKING

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A detailed understanding of the necking and post-necking behavior of stretched sheets is highly relevant during sheet metal forming. In the present work, for the special case of necking under plane strain conditions, non-local effects on the bifurcation stress are studied for a thickness comparable to the material length scale. A finite strain generalization of the strain gradient plasticity theory by Fleck and Hutchinson is employed in a finite element model. Parameters such as sheet thickness relative to the material length scale, and the sensitivity to initial imperfections are studied.